

‘Rockery 2’ - rock cycle game

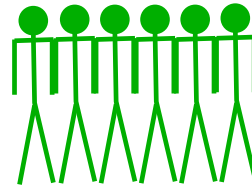
Model the stages of the rock cycle - with your pupils

This activity follows on from Rockery 1 - rock game. Before starting the activity, pupils should know the positions to adopt for particular stages in the rock cycle. These are shown in the diagrams opposite.

Pupils are divided into groups. The first group to get into the correct position for the rock mentioned gets one point. Of course, it is not necessary to play the game in a competitive way.

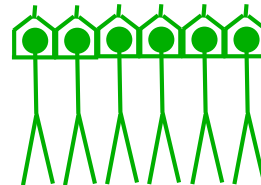
The teacher then tells the story:-

- there are some mountains and these mountains are made of **granite** - pupils should adopt the positions shown in diagram 7;
 - the mountains are **weathered and eroded** - pupils should now separate;
 - sand grains are carried along in a river and are deposited. Gradually they become cemented and compacted to form **sandstone** (diagram 1);
 - mud or clay grains are carried along in a river and are deposited. Gradually they become compacted to form **mudstone** (diagram 2);
 - meanwhile, in the sea, the remains of sea creatures are broken up and become compacted and cemented with calcium carbonate. They form **limestone** (diagram 3);
 - plate tectonic movement causes the rocks to suffer tremendous heat and pressure and the limestone re-crystallises to form **marble** (diagram 4).
- Note: this position is similar to igneous rocks but here there is only one dominant mineral - calcite;*
- the mudstone re-crystallises to form **slate** (diagram 5);
 - the sandstone re-crystallises to form **quartzite** (diagram 4).
- Note: this position is similar to igneous rocks but here there is only one dominant mineral - quartz;*
- but, plate tectonic movement continues and the heat and pressure increase until the rocks **melt** (diagram 6);
 - the melt or magma starts to cool. If it cools deep down in the Earth’s crust, the crystals grow big and a coarse-grained rock like **granite** forms (diagram 7);
 - if the magma comes up to the surface and flows out as **lava**, when it cools, a fine-grained rock like **basalt** is formed, (diagram 8);
 - eventually plate movement will **lift up** the rocks into mountains and the whole cycle will start again.



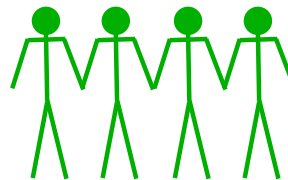
1. Sedimentary sandstone

- stand shoulder to shoulder with arms straight



2. Sedimentary mudstone

- stand with arms raised, hands together



3. Sedimentary limestone

- stand holding hands



4. Metamorphic quartzite or marble

- stand with arms linked but close together. You are all the same mineral



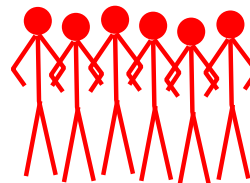
5. Metamorphic slate

- stand with arms linked but in straight lines, close together



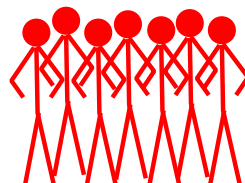
6. Melt or magma

- bend down



7. Igneous intrusive, granite

- stand with arms linked but as wide apart as possible. You are lots of different minerals



8. Igneous extrusive lava, basalt

- stand with arms linked but close together. You are lots of different minerals

The back up

Title: Rockery 2 - rock cycle game

Subtitle: Model the stages of the rock cycle - with your pupils

Topic: This activity models the stages of the rock cycle and can be used in both science and geography lessons

Age range of pupils: 10 - 18 years

Time needed to complete activity: 30 minutes

Pupil learning outcomes: Pupils can:

- appreciate that coarser sedimentary rocks, e.g. sandstone and limestone, are formed by grains being cemented and compacted together while finer rocks, e.g. mudstones, are formed by compaction only;
- realise that sandstones and mudstones are made from weathered and eroded minerals from other rocks. They are 'second-hand' rocks;
- realise that limestones form in the sea and are cemented by calcium carbonate;
- appreciate that both metamorphic rocks and igneous rocks are made of interlocking minerals;
- realise that in metamorphic rocks, minerals are either lined up, as in slate, or the rock is made of one dominant mineral only so that any alignment cannot be seen, as in marble;
- realise that igneous rocks form from the cooling and crystallisation of magma;
- realise that igneous rocks which cooled slowly have large crystals and igneous rocks which cooled quickly have small crystals;
- appreciate that all rocks are formed in part of the rock cycle which is repeated continuously.

Context:

Rocks can only be understood properly when their formation is put into the context of the rock cycle.

Following up the activity:

Pupils could try to write a poem, song or rap for this activity.

They could also try to put some local rocks into the three groups. The Earthlearningidea series Building Stones 1, 2, 3 and 4 will help with identification.

Underlying principles:

- Coarse grained sedimentary rocks like sandstones and limestones, are made of grains which have been cemented and compacted together.
- Fine grained sedimentary rocks like mudstones, are formed by compaction only.
- Rocks which have been subjected to the heat and/or pressure from plate tectonic movement become metamorphosed and are composed of interlocking crystals.
- Some metamorphic rocks show crystal alignment, e.g. slate, schist, gneiss.
- Some metamorphic rocks show no alignment and are made of one dominant mineral e.g. marble, quartzite.
- Igneous rocks form from the cooling and crystallisation of molten rock or magma. The crystals are usually randomly arranged.

Thinking skill development:

By modelling the stages of the rock cycle, pupils can see a pattern. Cognitive conflict is caused when rocks do not appear to fit the pattern. Metacognition is involved in the discussions about the rock cycle. Bridging is required by the pupils as they pretend to be the rocks in the rock cycle.

Resource list:

- plenty of space and a dry day
- musical instruments (optional)

Useful links:

The following Earthlearningideas <http://www.earthlearningidea.com>
James Hutton - or 'Mr. Rock Cycle?'
'Rock Cycle in wax'
'Rock cycle through the window'.

Source: Developed by Elizabeth Devon of the Earthlearningidea team with the help of the teachers and pupils of Box Church of England primary school.

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